

Catalogue of American Amphibians and Reptiles.

Powell, R. and A.M. Bauer. 2012. *Anolis gingivinus*.

***Anolis gingivinus* Cope**
Anguilla Bank Tree Anole

Anolis gingivinus Cope 1864:170. Type-locality, "Anguilla Rock near Trinidad" (see Cope 1871), restricted by Lazell (1972) to Sandy Ground, Anguilla. Syntypes, British Museum of Natural History [now The Natural History Museum, London] (BMNH) 1946.8.29.15–20, BMNH 1946.8.29.15, an adult male, was designated the lectotype by Lazell (1980), the series was "presented by W.J. Cooper to the British Museum" (not examined by authors). See **Remarks**.

Anolis virgatus Garman 1887:41. Type-locality, "St.-Barthélémy." Syntypes, Academy of Natural Sciences of Philadelphia (ANSP) 23007 (adult female), National Museum of Natural History (USNM) 39300 (an adult male), University of Michigan Museum of Zoology (UMMZ) 60243 (an adult male and a subadult), Museum of Comparative Zoology (MCZ) 6165 (MCZ-R-171265–72, including at least one adult male), collected in 1884 by F. Lagois (not examined by authors).

Anolis krugi gingivinus: Barbour 1937:121.

Anolis bimaculatus gingivinus: Underwood 1959:196.

Ctenonotus gingivinus: Schwartz and Henderson 1988:112. See **Remarks**.

• **CONTENT.** No subspecies are recognized.

• **DEFINITION.** *Anolis gingivinus* is a medium-sized anole, with maximum SVL in males to 72 mm (Lazell 1972) and in females to 54 mm (Dobson et al. 1992, Eaton et al. 2002). The head scalation (Schwartz and Henderson 1991) is characterized by 5–6 rows of loreals, 1–3 scales between the interparietal and supraorbital semicircles, 3 postrostrals, and 4 postmentals. The subocular scales are in contact with the supralabials. The scales behind the interparietal merge gradually into dorsal body scales. Dorsal scales are granular, with the two middorsal rows enlarged and juxtaposed. Ventral scales are cycloid, smooth, and slightly imbricate. Supradigital scales are multicarinate. The middorsal row of caudal scales is enlarged. The 10th caudal verticil contains 4–5 rows of scales.

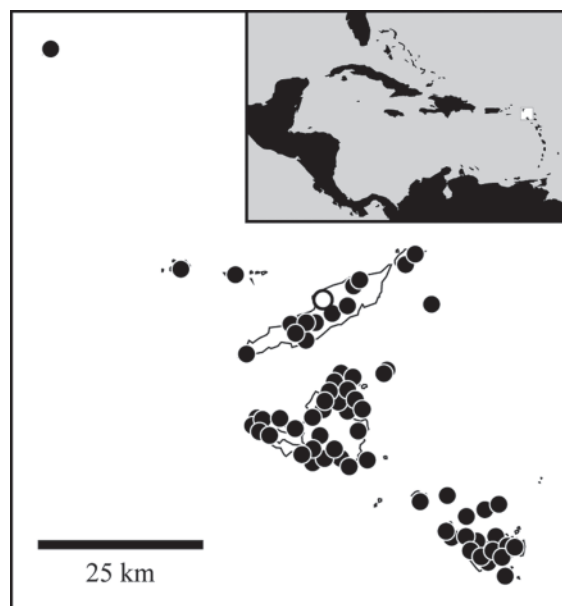
Individuals of both sexes are various shades of brown, occasionally olive to light green or rust with a cream to bright yellow venter. A broad middorsal stripe is usually evident, and bold, light stripes extend along the flank from shoulder to groin. Males may be heavily spotted or marbled with gray and brown. The dewlap is yellow-orange with white scales.

• **DIAGNOSIS.** Three other species in the genus *Anolis* have been reported from the Anguilla Bank. *Anolis pogus* is extant on St.-Martin/St. Maarten, existed on Anguilla, and might have occurred on St.-



FIGURE 1. Adult male (top) and female *Anolis gingivinus* from St. Martin (photographs by John S. Parmerlee, Jr.).

Barthélémy (Schwartz and Henderson 1991). An introduced population of *A. bimaculatus* was reported from St. Maarten by Powell et al. (1992), but that population is no longer extant (Powell et al. 2011). *Anolis carolinensis* was recently introduced to Anguilla (Eaton et al. 2001), where it persists in pockets of mesic habitats often associated with resorts. *Anolis gingivinus* can be distinguished from these sympatric congeners by the combination of smooth ventral scales (ventral scales are keeled in *A. pogus* and *A. carolinensis*) and the presence of a prominent pale flank stripe extending to the groin (*A. bimaculatus*



MAP. Distribution of *Anolis gingivinus* (modified from Schwartz and Henderson 1991). The circle marks the restricted type locality and dots indicate other records.

occasionally has a pale flank stripe, but it does not extend to the groin; Schwartz and Henderson 1985).

• **DESCRIPTIONS.** In addition to the original descriptions by Cope (1864) and Garman (1888), detailed descriptions are provided in Boulenger (1885), Lazell (1972), Schwartz and Henderson (1991), and Breuil (2002).

• **ILLUSTRATIONS.** Boulenger (1885) provided a black-and-white illustration of the species, and black-and-white photographs are in Wijffels (1960, 1964a, 1964b). Molle (1958, 1961a) presented black-and-white photographs of an *A. sagrei* x *A. gingivinus* hybrid. Color photographs are in Wijffels (1980), Heselhaus and Schmidt (1990), Roughgarden (1995), Fläschendräger and Wijffels (1996, 2009), Rojer (1997), Malhotra and Thorpe (1999), Breuil (2002, 2004), Hodge et al. (2003), Powell et al. (2005), Preston and Johnson (2010), Yokoyama (2010), and Wright (2011). Colored illustrations are in Lazell (1972) and Schwartz and Henderson (1985). Gorman and Atkins (1966) provided an illustration of the karyotype.

• **DISTRIBUTION.** An Anguilla Bank endemic, the species is found in a variety of natural and altered habitats throughout the Bank (Hodge et al. 2003). Anoles from Sombrero, which is on an island bank that was never connected to the Anguilla Bank, have historically been assigned to this taxon (see comments in Lazell 1964, Hodge et al. 2003, and Wright 2011). Cope (1871), followed by Barbour (1914, 1923, 1930a, 1930b, 1935, 1937), erroneously listed the species from St. Eustatius. The range was previously illustrated in Schwartz and Henderson (1991) and Breuil (2002).

• **FOSSIL RECORD.** Pregill et al. (1994) considered fossil *Anolis* material from Center Cave and The Fountain on Anguilla to be consistent with *A. gingivinus*, although definitively diagnostic features could not be found.

• **PERTINENT LITERATURE.** References to *Anolis gingivinus* are arranged by topic: **Behavior** (van Rekum 1960, Wijffels 1960, Molle 1961a), **conservation status** (Hodge et al. 2003, 2011; Powell et al. 2005; Powell 2006, 2011; Lorgelec et al. 2007, 2011), **ecology and natural history** (Wijffels 1964a; Heckel 1980; Pacala and Roughgarden 1982, 1985; Roughgarden et al. 1983a, 1983b, 1984; Roughgarden 1983, 1986, 1995; McLaughlin and Roughgarden 1989; Roughgarden and Pacala 1989; Schwartz and Henderson 1991; Powell and Henderson 1992, 2008; Goldwasser and Roughgarden 1993; Henderson and Sajdak 1996; Shafir and Roughgarden 1998; Breuil 2002; Eaton et al. 2002; Pereira et al. 2002; Shew et al. 2002; Hodge et al. 2003; Powell et al. 2005; Larimer et al. 2006; Perry et al. 2008; Henderson and Powell 2009; Losos 2009; Yokoyama 2010), **evolution, systematics, phylogenetics, and biogeography** (Gorman and

Atkins 1966, 1969; Lazell 1972; Gorman and Kim 1976; Chakraborty et al. 1978; Gorman and Renzi 1979; Heckel 1980; Roughgarden et al. 1983a; Burnell and Hedges 1990; Losos 1990, 1992a, 2009; Nicholson et al. 2005; Roughgarden 1992, 1995; Miles and Dunham 1996; Butler and Losos 1997; Schneider et al. 2001; Stenson et al. 2004; Thomas et al. 2009), **husbandry (including captive hybridization)** (Molle 1961b,c,d; Mertens 1964; Wijffels 1964a,b; Stettler 1978; Fläschendräger and Wijffels 1996, 2009; Heselhaus and Schmidt 1990), **karyotype** (Gorman and Atkins 1966, Gorman 1973, Schwenk et al. 1982), and **parasites and parasite-mediated competition** (Schall 1990, 1992; Dobson and Pacala 1992; Dobson et al. 1992; Dobson and Roberts 1994; Bursey and Goldberg 1996; Goldberg et al. 1997; Staats and Schall, 1996a–b; Schall and Staats 1997; Perkins 2001; Telford 2009; Losos 2009; Preston and Johnson 2010).

This species is included in **checklists, guides, and notes** (some of which include brief descriptions), and **general works** (topics in parentheses) by Archie et al. (1989, allozyme frequency data), Barbour (1914, 1923, 1930a, 1930b, 1935, 1937), Barbour and Loveridge (1929), Bergmann (2008), Beuttell and Losos (1999, ecomorphology), Biknevicus et al. (1993), Brandley and de Queiroz (2004, outgroup in phylogenetic study), Breuil (2004), Censky and Kaiser (1999), Cochran (1934, 1938, 1961), Cope (1869), Currat (1980), Dunn (1934), Edgar (2010), Etheridge (1960, anoline relationships based on skeletal morphology), Faizool (1998), Fläschendräger (2010, possible interactions with introduced *A. sagrei*), Fläschendräger and Wijffels (1996, 2009), Frank and Ramus (1995), Fuerst et al. (1977, protein polymorphism), Garman (1887), Gerber (1999, intraguild predation), Glossip and Losos (1997, subdigital lamellae), Harvey (1993, evolutionary succession), Heckel and Roughgarden (1979) and Heckel (1982, estimating population sizes), Henderson and Breuil (2012), Henderson and Powell (1999, 2009), Herrel et al. (2004, frugivory), Hodge et al. (2003, 2011), Kluge (1984), Levesque et al. (2008), Lorgelec et al. (2007, 2011), Losos (1992b, community structure; 1994a, 2009, anoles as model organisms; 1994b, history and community ecology; 1996, species-area relations), Losos and de Queiroz (1997, ecological release), MacLean et al. (1977), Malhotra and Thorpe (1999), Malnate (1971), Naganuma and Roughgarden (1990, optimal body size), Nicholson et al. (2007, dewlap diversity), Ogden et al. (1985, Sombrero Island), O'Hare and Williams (1994, see also Williams et al. 1995), O'Shaughnessy (1875), Pacala et al. (1983, field enclosures), Parker (1933), Poe (1999, 2004, phylogeny), Poe et al. (2005, phylogeny reconstruction; 2007, solitary anoles; 2011, colonization), Pough et al. (1998), Powell (2006, 2011), Powell et al. (1996, 2005), Pregill et al. (1994, fossil material), Procter and Fleming (1999), Rojer (1997), Roughgarden (1974, niche width; 1990, origin of the eastern Caribbean), Schoener (1970a, size correlations between sympatric species; 1970b, spatial overlap),

Schwartz and Henderson (1985, 1988, 1991), Schwartz and Thomas (1975), Sinervo et al. (2010, effects of climate change), Sites and Murphy (1991, genetics), Stamps and Andrews (1992, estimating asymptotic size), Stenson et al. (2000, microsatellites), Stettler (1978), Underwood (1959, 1962), Vitt and Caldwell (2009), Williams (1969, zoogeography; 1972, origin of faunas; 1976, 1999), and Zug et al. (1993, 2001).

• **ETYMOLOGY.** The name *gingivinus* is derived from the Latin, "pertaining to the gums." The relevance of the name is uncertain.

• **REMARKS.** Lazell (1980) noted that the type series (BMNH 1946.8.29.15–20) consisted of six specimens, Underwood (1959) listed only three (BMNH 1946.8.29.18–20), and that shorter series subsequently was recorded by Schwartz and Thomas (1975), Schwartz and Henderson (1988, 1991), and Breuil (2002).

Guyer and Savage (1986) elevated the anoline genus *Ctenonotus*, in which they (Savage and Guyer 1989, 2004) placed *Anolis gingivinus*. Although the genera recognized by Guyer and Savage (1986) were used by Schwartz and Henderson (1988) and have been employed especially by biologists working on the American mainland, we prefer a more conservative approach until concerns regarding generic relationships among anoles (e.g., Williams 1989) have been addressed. Subsequent to Schwartz and Henderson (1988), no major publications dealing with West Indian species of anoles have used the generic names advocated by Guyer and Savage (1986).

• **ACKNOWLEDGEMENTS.** John S. Parmelee, Jr. prepared the map, Ned Gilmore (ANSP) and Addison Wynn and Kevin de Queiroz (USNM) examined syntypes under their care, and Axel Fläschendräger provided some difficult-to-find references.

LITERATURE CITED

- Archie, J.W., C. Simon, and A. Martin. 1989. Small sample size does decrease the stability of dendrograms calculated from allozyme-frequency data. *Evolution* 43:678–683.
- Barbour, T. 1914. A contribution to the zoögeography of the West Indies, with especial reference to amphibians and reptiles. *Mem. Mus. Comp. Zool.* 44:205–359 + 1 pl.
- . 1923. West Indian investigations of 1922. *Occ. Pap. Mus. Zool. Univ. Michigan* (132):1–7.
- . 1930a. A list of Antillean reptiles and amphibians. *Zoologica* (N.Y.) 11:61–116.
- . 1930b. The anoles I. The forms known to occur on the Neotropical islands. *Bull. Mus. Comp. Zool.* 70:105–144.
- . 1935. A second list of Antillean reptiles and amphibians. *Zoologica* (N.Y.) 19:77–141.
- . 1937. Third list of Antillean reptiles and amphibians. *Bull. Mus. Comp. Zool.* 82:77–166.
- and A. Loveridge. 1929. Typical reptiles and amphibians. *Bull. Mus. Comp. Zool.* 69:203–360.
- Bergmann, P.J. 2008. A phylogenetic and functional approach to the study of evolution of body shape in lizards (Squamata). Unpubl. Ph.D. diss., Univ. Massachusetts, Amherst.
- Beuttell, K. and J.B. Losos. 1999. Ecological morphology of Caribbean anoles. *Herpetol. Monogr.* 13:1–28.
- Biknevicius, A.R., D.A. McFarlane, and R.D.E. MacPhee. 1993. Body size in *Amblyrhiza inundata* (Rodentia: Caviomorpha), an extinct megafaunal rodent from the Anguilla Bank, West Indies: Estimates and implications. *Amer. Mus. Novitates* (3079):1–25.
- Boulenger, G.A. 1885. Catalogue of the Specimens of Lizards in the Collection of the British Museum. 2nd ed. Vol. 2. Trustees (Brit. Mus.), London.
- Brandley, M.C. and K. de Queiroz. 2004. Phylogeny, ecomorphological evolution, and historical biogeography of the *Anolis cristatellus* series. *Herpetol. Monogr.* 18:90–126.
- Breuil, M. 2002. Histoire naturelle des amphibiens et reptiles terrestres de l'archipel Guadeloupéen. Guadeloupe, Saint-Martin, Saint Barthélemy. *Patr. Nat., Paris* 54: [2] + 339 p.
- . 2004. Les Amphibiens et Reptiles des Antilles. PLB Editions, Abymes, Guadeloupe.
- Burnell, K.L. and S.B. Hedges. 1990. Relationships of West Indian *Anolis* (Sauria: Iguanidae): An approach using slow-evolving protein loci. *Carib. J. Sci.* 26:7–30.
- Burse, C.R. and S.R. Goldberg. 1996. *Oochoristica maccoyi* n. sp. (Cestoda: Lonstowiidae) from *Anolis gingivinus* (Sauria: Polychrotidae) collected in Anguilla, Lesser Antilles. *Carib. J. Sci.* 32:390–394.
- and —. 1998. Reclassification of *Spauligodon anolis* (Chitwood, 1934) Inglis 1968 as *Spauligodon anolis* (Chitwood, 1934) n. comb. (Nematoda: Pharyngodonidae) from *Anolis* lizards of the Caribbean. *J. Parasitol.* 84:819–822.
- Butler, M.A. and J.B. Losos. 1997. Testing for unequal amounts of evolution in a continuous character on different branches of a phylogenetic tree using linear and squared-change parsimony: An example using Lesser Antillean *Anolis* lizards. *Evolution* 51:1623–1635.
- Censky, E.J. and H. Kaiser. 1999. The Lesser Antillean fauna, p. 181–221. *In* B.I. Crother (ed.), *Caribbean Amphibians and Reptiles*. Academic Press, San Diego.
- Chakraborty, R., P.A. Fuerst, and M. Nei. 1978. Statistical studies on protein polymorphism in natural populations II. Gene differentiation between populations. *Genetics* 88:367–390.
- Cochran, D.M. 1934. Herpetological collections from the West Indies made by Dr. Paul Bartsch under the Walter Rathbone Bacon Scholarship, 1928–1930. *Smithson. Misc. Coll.* 92:1–48.
- . 1938. Reptiles and amphibians from the Lesser Antilles collected by Dr. S.T. Danforth. *Proc. Biol. Soc. Washington* 51:147–156.

- . 1961. Type specimens of reptiles and amphibians in the U.S. National Museum. U.S. Natl. Mus. Bull. (220):xv + 291 p.
- Cope, E.D. 1864. Contributions to the herpetology of tropical America. Proc. Acad. Nat. Sci. Philadelphia 16:166–181.
- . 1869. Seventh contribution to the herpetology of tropical America. Proc. Amer. Philos. Soc. 11: 147–169.
- . 1871. Ninth contribution to the herpetology of tropical America. Proc. Acad. Nat. Sci. Philadelphia 1871:200–224.
- Currat, P. 1980. Reptiles des Antilles, perçu sur les reptiles antillais de Guadeloupe et Martinique principalement. Centre Dépt. Docum., Péd. Guadeloupe, Pointe-à-Pitre.
- Dobson, A. and S.W. Pacala. 1992. The parasites of *Anolis* lizards of the northern Lesser Antilles, II: The structure of the parasite community. *Oecologia* 91:118–125.
- and M. Roberts. 1994. The population dynamics of parasitic helminth communities. *Parasitology* 109 (suppl.):S97–S108.
- , —, J. Roughgarden, E.R. Carper, and E.A. Harris. 1992. The parasites of *Anolis* lizards in the northern Lesser Antilles. I. Patterns of distribution and abundance. *Oecologia* 91:110–117.
- Dunn, E.R. 1934. Physiography and herpetology in the Lesser Antilles. *Copeia* 1934:105–111.
- Eaton, J.M., K.G. Howard, and R. Powell. 2001. Geographic distribution: *Anolis carolinensis*. *Herpetological Review* 32:118.
- , S.C. Larimer, K.G. Howard, R. Powell, and J.S. Parmerlee, Jr. 2002. Population densities and ecological release of a solitary species: *Anolis gingivinus* on Anguilla, West Indies. *Carib. J. Sci.* 38:27–36.
- Edgar, P. 2010. The Amphibians and Reptiles of the UK Overseas Territories, Crown Dependencies and Sovereign Base Areas. Species Inventory and Overview of Conservation and Research Priorities. Amphib. Rept. Conserv., Dorset, UK.
- Etheridge, R.E. 1960. The relationships of the anoles (Reptilia: Sauria: Iguanidae): An interpretation based on skeletal morphology. Ph.D. Diss., Univ. Michigan, Ann Arbor.
- Faizool, S. 1998. Forestry policy of Anguilla, p. 1–16. In *Forestry Policies in the Caribbean*. Vol. 2: Reports of 28 Selected Countries and Territories. FAO Forestry Paper 137/2. Food and Agriculture Organization of the United Nations, Rome.
- Fläschendräger, A. 2010. Cuban Brown Anoles (*Anolis sagrei*) in St. Maarten. Rept. & Amphib. 17:121–122.
- and L. Wijffels. 1996. *Anolis* in Biotop und Terrarium. Natur und Tier Verlag, Matthias Schmidt, Münster.
- and —. 2009. *Anolis* in Biotop und Terrarium. 2nd ed. Natur und Tier Verlag, Matthias Schmidt, Münster.
- Frank, N. and E. Ramus. 1995. A Complete Guide to Scientific and Common Names of Reptiles and Amphibians of the World. NG Publ., Inc., Pottsville, Pennsylvania.
- Fuerst, P.A., R. Chakraborty, and M. Nei. 1977. Statistical studies on protein polymorphism in natural populations I. Distribution of single locus heterozygosity. *Genetics* 86:455–483.
- Garman, S. 1887. On West Indian reptiles. Iguanidæ. Bull. Essex Inst. 19:25–50.
- Gerber, G.P. 1999. A review of intraguild predation and cannibalism in *Anolis*, p. 28–39. In J.B. Losos and M. Leal (eds.), *Anolis Newsletter V*. Washington Univ., St. Louis, Missouri.
- Glossip, D. and J.B. Losos. 1997. Ecological correlates of number of subdigital lamellae in anoles. *Herpetologica* 53:192–199.
- Goldberg, S.R., C.R. Bursey, and H. Cheam. 1997. Helminths of 12 species of *Anolis* lizards (Polychrotidae) from the Lesser Antilles, West Indies. *J. Helminthol. Soc. Washington* 64: 248–257.
- Goldwasser, L. and J. Roughgarden. 1993. Construction and analysis of a large Caribbean food web. *Ecology* 74:1216–1233.
- Gorman, G.C. 1973. The chromosomes of the Reptilia, a cytotaxonomic interpretation, p. 349–424. In A.B. Chiarelli and E. Capanna (eds.), *Cytotaxonomy and Vertebrate Evolution*. Academic Press, London.
- and L. Atkins. 1966. Chromosomal heteromorphism in some male lizards of the genus *Anolis*. *Amer. Nat.* 100:579–583.
- and —. 1969. The zoogeography of Lesser Antillean *Anolis* lizards – an analysis based upon chromosomes and lactic dehydrogenases. *Bull. Mus. Comp. Zool.* 138:53–80.
- and J. Renzi, Jr. 1979. Genetic distance and heterozygosity estimates in electrophoretic studies: Effects of sample size. *Copeia* 1979:242–249.
- and Y.J. Kim. 1976. *Anolis* lizards of the eastern Caribbean: A case study in evolution. II. Genetic relationships and genetic variation of the *bimaculatus* group. *Syst. Zool.* 25:62–77.
- Guyer, C. and J.M. Savage. 1986. Cladistic relationships among anoles (Sauria: Iguanidae). *Syst. Zool.* 35:509–531.
- Harvey, P.H. 1993. The ecology of evolutionary succession. *Curr. Biol.* 3: 106–108.
- Heckel, D.G. 1980. Extensions of the theory of evolutionary ecology, and the ecology of *Anolis gingivinus*. Unpubl. Ph.D. diss., Stanford Univ., Palo Alto, California.
- . 1982. *Anolis gingivinus*, p. 15–16. In D.E. Davis (ed.), *CRC Handbook of Census Methods for Terrestrial Vertebrates*. CRC Press, Boca Raton, Florida.
- and J. Roughgarden. 1979. A technique for estimating the size of lizard populations. *Ecology* 60:966–975.
- Henderson, R.W. and M. Breuil. 2012. Lesser Antilles, p. 150–161. In R. Powell and R.W. Henderson (eds.), *Island lists of West Indian amphibians and reptiles*. Bull. Florida Mus. Nat. Hist. 51: 87–168.
- and R. Powell. 1999. West Indian herpetoecology,

- p. 223–268. In B.I. Crother (ed.), *Caribbean Amphibians and Reptiles*. Academic Press, San Diego, California.
- and —. 2009. *Natural History of West Indian Reptiles and Amphibians*. Univ. Press Florida, Gainesville.
- and R.A. Sajdak. 1996. Diets of West Indian racers (Colubridae: Alsophis): Composition and biogeographic implications, p. 317–326. In R. Powell and R. W. Henderson (eds.), *Contributions to West Indian Herpetology: A Tribute to Albert Schwartz*. Contributions to Herpetology, vol. 12. Soc. Study Amphib. Rept., Ithaca, New York.
- Herrel, A., B. Vanhooydonck, R. Joachim and D. J. Irschick. 2004. Frugivory in polychrotid lizards: Effects of body size. *Oecologia* 140:160–168.
- Heselhaus, R. and M. Schmidt. 1990. *Karibische Anolis*. Herpetologischer Fachverlag, Münster.
- Hodge, K.V.D., E.J. Censky, and R. Powell. 2003. *The Reptiles and Amphibians of Anguilla*, British West Indies. Anguilla National Trust, The Valley.
- , R. Powell, and E.J. Censky. 2011. Conserving the herpetofauna of Anguilla, p. 3–15. In A. Hailey, B.S. Wilson, and J.A. Horrocks (eds.), *Conservation of Caribbean Island Herpetofaunas*. Volume 2. Brill, Leiden, The Netherlands.
- Kluge, A.G. 1984. Type-specimens of reptiles in the University of Michigan Museum of Zoology. Misc. Publ. Mus. Zool. Univ. Michigan (167):ii + 85 p.
- Larimer, S.C., R. Powell, and J.S. Parmelee, Jr. 2006. Effects of structural habitat on the escape behavior of the lizard, *Anolis gingivinus*. *Amphib.-Rept.* 27:569–574.
- Lazell, J.D., Jr. 1964. The reptiles of Sombrero, West Indies. *Copeia* 1964:716–718.
- . 1972. The anoles (Sauria, Iguanidae) of the Lesser Antilles. *Bull. Mus. Comp. Zool.* 143: 1–115.
- . 1980. Lesser Antillean *Anolis* (Sauria, Iguanidae) in the British Museum. *J. Herpetol.* 14:194–195.
- Levesque, A., A. Mathurin, and F. Le Quellec. 2008. St. Bathémy, p. 263–267. In D.C. Wege and V. Anadon-Irizarry (eds.), *Important Bird Areas in the Caribbean*. BirdLife International, Cambridge, U.K.
- Lorvelec, O., M. Pascal, D. Pavis, and P. Feldmann. 2007. Amphibians and reptiles of the French West Indies: Inventory, threats and conservation. *Appl. Herpetol.* 4:131–161.
- , —, —, and —. 2011. Amphibians and reptiles of the French West Indies: Inventory, threats and conservation, p. 205–237. In A. Hailey, B.S. Wilson, and J.A. Horrocks (eds.), *Conservation of Caribbean Island Herpetofaunas*. Volume 2. Brill, Leiden, The Netherlands.
- Losos, J.B. 1990. A phylogenetic analysis of character displacement in Caribbean *Anolis* lizards. *Evolution* 44:558–569.
- . 1992a. A critical comparison of the taxon-cycle and character-displacement models for size evolution of *Anolis* lizards in the Lesser Antilles. *Copeia* 1992:279–288.
- . 1992b. The evolution of convergent structure in Caribbean *Anolis* communities. *Syst. Biol.* 41:403–420.
- . 1994a. Integrative approaches to evolutionary ecology: *Anolis* lizards as model systems. *Ann. Rev. Ecol. Syst.* 25:467–493.
- . 1994b. Historical contingency and lizard community ecology, p. 319–333. In L.J. Vitt and E.R. Pianka (eds.), *Lizard Ecology: Historical and Experimental Perspectives*. Princeton Univ. Press, Princeton, New Jersey.
- . 1996. Ecological and evolutionary determinants of the species-area relation in Caribbean anoline lizards. *Phil. Trans. Roy. Soc. Lond. B* 351: 847–854.
- . 2009. *Lizards in an Evolutionary Tree: Ecology and Adaptive Radiation of Anolis*. Univ. California Press, Berkeley and Los Angeles.
- and K. de Queiroz. 1997. Evolutionary consequences of ecological release in Caribbean *Anolis* lizards. *Biol. J. Linnean Soc.* 61:459–483.
- MacLean, W.P., R. Kellner, and H. Dennis. 1977. Island lists of West Indian amphibians and reptiles. *Smithson. Herpetol. Info. Serv.* (40):1–47.
- Malhotra, A. and R.S. Thorpe. 1999. *Reptiles and Amphibians of the Eastern Caribbean*. MacMillan Educ. Ltd., London.
- Malnate, E.V. 1971. A catalog of primary types in the herpetological collections of the Academy of Natural Sciences, Philadelphia (ANSP). *Proc. Acad. Nat. Sci. Philadelphia* 123:345–375.
- McLaughlin, J.F. and J. Roughgarden. 1989. Avian predation on *Anolis* lizards in the northeastern Caribbean: An inter-island contrast. *Ecology* 70:617–628.
- Mertens, R. 1964. Über Reptilienbastarde, III. *Senck. Biol.* 45:33–49.
- Miles, D.B. and A.E. Dunham. 1996. The paradox of the phylogeny: Character displacement of analyses of body size in island *Anolis*. *Evolution* 50:594–603.
- Molle, F. 1958. Über die Aufzucht von *Anolis*. *Aquar. Terrar. Zeitschr.* 11:119–121.
- . 1961a. 7 Jahre Anoliszucht. Erfahrungen und Erkenntnisse. *Aquar. Terrar. Zeitschr.* 14: 147–149.
- . 1961b. 7 Jahre Anoliszucht—Erfahrungen und Erkenntnisse II. *Aquar. Terrar. Zeitschr.* 14: 181–183.
- . 1961c. 7 Jahre Anoliszucht—Erfahrungen und Erkenntnisse III. *Aquar. Terrar. Zeitschr.* 14: 214–217.
- . 1961d. 7 Jahre Anoliszucht—Erfahrungen und Erkenntnisse IV. *Aquar. Terrar. Zeitschr.* 14: 244–245.
- Naganuma, K.H. and J.D. Roughgarden. 1990. Optimal body size in Lesser Antillean *Anolis* lizards—A mechanistic approach. *Ecological Monographs* 60:239–256.
- Nicholson, K.E., R.E. Glor, J.J. Kolbe, A. Larson, S.B. Hedges, and J.B. Losos. 2005. Mainland colonization by island lizards. *J. Biogeogr.* 32:929–938.

- , L.J. Harmon, and J.B. Losos. 2007. Evolution of *Anolis* lizard dewlap diversity. *PLoS ONE* 2007:1–12.
- Ogden, N.B., W.G. Gladfelter, J.C. Ogden, and E.H. Gladfelter. 1985. Marine and terrestrial flora and fauna notes on Sombbrero Island in the Caribbean. *Atoll Res. Bull.* (292):61–74.
- O'Hare, R.J. and E.E. Williams. 1994. The *Anolis* Handlist. Hypercard document, Mus. Comp. Zool., Harvard Univ., Cambridge, Massachusetts.
- O'Shaughnessy, A.W.E. 1875. List and revision of the species of Anolidæ in the British-Museum collection, with descriptions of new species. *Ann. Mag. Nat. Hist.*, ser. 4, 15:270–281.
- Pacala, S.W. and J. Roughgarden. 1982. Resource partitioning and interspecific competition in two two-species insular *Anolis* lizard communities. *Science* 217:444–446.
- and —. 1985. Population experiments with the *Anolis* lizards of St. Maartin and St. Eustatius. *Ecology* 66:129–141.
- , J. Rummel, and J. Roughgarden. 1983. A technique for enclosing *Anolis* lizard populations under field conditions. *J. Herpetol.* 17:94–97.
- Parker, H.W. 1933. Some amphibians and reptiles from the Lesser Antilles. *Ann. Mag. Nat. Hist.* 10:151–158.
- Pereira, H.M., S.R. Loarie, and J. Roughgarden. 2002. Monogamy, polygyny and interspecific interactions in the lizards *Anolis pogus* and *Anolis gingivinus*. *Carib. J. Sci.* 38:132–136.
- Perkins, S.L. 2001. Phylogeography of Caribbean lizard malaria: Tracing the history of vector-borne parasites. *J. Evol. Biol.* 14:34–45.
- Perry, G., B.W. Buchanan, R.N. Fisher, M. Salmon, and S.E. Wise. 2008. Effects of artificial night lighting on reptiles and amphibians in urban environments, p. 239–256. *In* R.E. Jung and J.C. Mitchell (eds.), *Urban Herpetology*. *Herpetological Conservation*, vol. 3. Soc. Study Amphib. Rept., Salt Lake City, Utah.
- Poe, S. 1999. Untitled, p. 99–104. *In* J.B. Losos and M. Leal (eds.), *Anolis Newsletter V*. Washington Univ., St. Louis, Missouri.
- . 2004. Phylogeny of anoles. *Herpetol. Monogr.* 18:37–89.
- . 2005. A study of the utility of convergent characters for phylogeny reconstruction: Do ecomorphological characters track evolutionary history in *Anolis* lizards? *Zoology* 108:337–343.
- , J.R. Goheen, and E.P. Hulebak. 2007. Convergent exaptation and adaptation in solitary island lizards. *Proc. Roy. Soc. Lond. B* 274: 2231–2237.
- , J.T. Giermakowski, I. Latella, E.W. Schaad, E.P. Hulebak, and M.J. Ryan. 2011. Ancient colonization predicts recent naturalization in *Anolis* lizards. *Evolution* 65:1195–1202.
- Pough, F.H., R.M. Andrews, J.E. Cadle, M.L. Crump, A.H. Savitzky, and K.D. Wells. 1998. *Herpetology*. Prentice Hall, New Jersey.
- Powell, R. 2006. Conservation of the herpetofauna on the Dutch Windward Islands: St. Eustatius, Saba, and St. Maarten. *Appl. Herpetol.* 3: 293–306.
- . 2011. Conservation of the herpetofauna on the Dutch Windward Islands: St. Eustatius, Saba, and St. Maarten, p. 189–204. *In* A. Hailey, B.S. Wilson, and J.A. Horrocks (eds.), *Conservation of Caribbean Island Herpetofaunas*. Volume 2: Regional Accounts of the West Indies. Brill, Leiden, The Netherlands.
- and R.W. Henderson. 1992. *Anolis gingivinus* (NCN). Nocturnal activity. *Herpetol. Rev.* 23:117.
- and —. 2008. Urban herpetology in the West Indies, p. 389–404. *In* J.C. Mitchell, R.E. Jung Brown, and B. Bartholomew (eds.), *Urban Herpetology*. *Herpetological Conservation*, vol. 3. Soc. Study Amphib. Rept., Salt Lake City, Utah.
- , R.J. Passaro, and R.W. Henderson. 1992. Noteworthy herpetological records from Saint [sic] Maarten, Netherlands Antilles. *Carib. J. Sci.* 28:234–235.
- , R.W. Henderson, K. Adler, and H.A. Dundee. 1996. An annotated checklist of West Indian amphibians and reptiles, p. 51–93 + 8 pl. *In* R. Powell and R.W. Henderson (eds.), *Contributions to West Indian Herpetology: A Tribute to Albert Schwartz*. SSAR Contrib. *Herpetol.*, vol. 12, Ithaca, New York.
- , —, and J.S. Parmerlee, Jr. 2005. Reptiles and Amphibians of the Dutch Caribbean: St. Eustatius, Saba, and St. Maarten. St. Eustatius National Parks Foundation, Gallows Bay, St. Eustatius, Netherlands Antilles.
- Pregill, G.K., D.W. Steadman, and D.R. Watters. 1994. Late Quaternary vertebrate faunas of the Lesser Antilles: Historical components of Caribbean biogeography. *Bull. Carnegie Mus. Nat. Hist.* 30:iii + 51 p.
- Preston, D. and P. Johnson. 2010. Ecological consequences of parasitism. *Nature Education Knowledge* 1(8):39 (www.nature.com/scitable/knowledge/library/ecological-consequences-of-parasitism-13255694).
- Procter, D. and L.V. Fleming (eds.). 1999. Biodiversity: The UK Overseas Territories. Joint Nature Conservation Committee, Peterborough, UK.
- Rojer, A. 1997. Biological Inventory of St. Maarten. Unpubl. report 96-10. Carmabi Foundation, Curaçao, Netherlands Antilles.
- Roughgarden, J. 1974. Niche width: Biogeographic patterns among *Anolis* lizard populations. *Amer. Nat.* 108:429–442.
- . 1983. Competition and theory in community ecology. *Amer. Nat.* 122:583–601.
- . 1986. A comparison of food-limited and space-limited animal competition communities, p. 492–516. *In* J. Diamond and T.J. Case (eds.), *Community Ecology*. Harper & Row, New York.
- . 1990. Origin of the eastern Caribbean: Data from reptiles and amphibians, p. 10–26. *In* K. LaRue and G. Draper (eds.), *Transactions of the 12th Caribbean Conference*. Miami Geol. Surv., St.

- Croix, USVI.
- , 1992. Comments on the paper by Losos: Character displacement versus taxon loop. *Copeia* 1992:288–295.
 - , 1995. *Anolis* Lizards of the Caribbean. Ecology, Evolution, and Plate Tectonics. Oxford Univ. Press, New York, Oxford.
 - and S. Pacala. 1989. Taxon cycle among *Anolis* lizard populations: Review of evidence, p. 403–432. In D. Otte and J.A. Endler (eds.), *Specialization and Its Consequences*. Sinauer, Sunderland, Massachusetts.
 - , D. Heckel, and E.R. Fuentes. 1983a. Coevolutionary theory and the biogeography and community structure of *Anolis*, p. 371–410. In R.B. Huey, E.R. Pianka, and T.W. Schoener (eds.), *Lizard Ecology: Studies of a Model Organism*. Harvard Univ. Press, Cambridge, Massachusetts.
 - , J. Rummel, and S. Pacala. 1983b. Experimental evidence of strong present-day competition between *Anolis* populations of the Anguilla Bank—a preliminary report, p. 499–506. In A.G.J. Rhodin and K. Miyata (eds.), *Advances in Herpetology and Evolutionary Biology*. Mus. Comp. Zool., Harvard Univ., Cambridge, Massachusetts.
 - , S. Pacala, and J. Rummel. 1984. Strong present-day competition between the *Anolis* lizard populations of St. Maarten (Neth. Antilles), p. 203–220. In B. Shorrocks (ed.), *Evolutionary Ecology*. Blackwell Science, Oxford.
- Savage, J.M. and C. Guyer. 1989. Infrageneric classification and species composition of the anole genera, *Anolis*, *Ctenonotus*, *Dactyloa*, *Norops*, and *Semiurus* (Sauria: Iguanidae). *Amphib.-Rept.* 10:105–116.
- and —. 2004. Application of anole lizard generic names proposed by Wagler, 1830 and Fitzinger, 1843. *Amphib.-Rept.* 25:303–305.
- Schall, J.J. 1990. The ecology of lizard malaria. *Parasitol. Today* 6:264–269.
- , 1992. Parasite-mediated competition in *Anolis* lizards. *Oecologia* 92:58–64.
 - and C.M. Staats. 1997. Parasites and the evolution of extravagant male characters: *Anolis* lizards on Caribbean islands as a test of the Hamilton-Zuk hypothesis. *Oecologia* 111: 543–548.
- Schneider, C.J., J.B. Losos, and K. de Queiroz. 2001. Evolutionary relationships of the *Anolis bimaculatus* group from the northern Lesser Antilles. *J. Herpetol.* 35:1–12.
- Schoener, T.W. 1970a. Size patterns in West Indian *Anolis* lizards. II. Correlations with the sizes of particular sympatric species—displacement and convergence. *Amer. Nat.* 104:155–174.
- , 1970b. Nonsynchronous spatial overlap of lizards in patchy habitats. *Ecology* 51:408–418.
- Schwartz, A. and R.W. Henderson. 1985. A guide to the identification of the amphibians and reptiles of the West Indies exclusive of Hispaniola. Milwaukee Pub. Mus., Milwaukee, Wisconsin.
- and —. 1988. West Indian amphibians and reptiles: A check-list. Milwaukee Pub. Mus. Contr. Biol. Geol. (74):1–264.
 - and —. 1991. Amphibians and Reptiles of the West Indies: Descriptions, Distributions, and Natural History. Univ. Florida Press, Gainesville.
 - and R. Thomas. 1975. A check-list of West Indian amphibians and reptiles. Carnegie Mus. Nat. Hist. Spec. Publ. (1):1–216.
- Schwenk, K., S.K. Sessions, and D.M. Peccinini Seale. 1982. Karyotypes of the basiliscine lizards *Corytophanes cristatus* and *Corytophanes hernandesii*, with comments on the relationship between chromosomal and morphological evolution in lizards. *Herpetologica* 38: 493–501.
- Shafir, S. and J. Roughgarden. 1998. Testing predictions of foraging theory for a sit-and-wait forager *Anolis gingivinus*. *Behavioral Ecology* 9:74–84.
- Shew, J.J., S.C. Larimer, R. Powell, and J.S. Parmerlee, Jr. 2002. Sleeping patterns and sleep-site fidelity of *Anolis gingivinus* on Anguilla. *Carib. J. Sci.* 38:136–138.
- Sinervo, B., F. Méndez-de-la-Cruz, D.B. Miles, B. Heulin, E. Bastiaans, M. Villagrán-Santa Cruz, R. Lara-Resendiz, N. Martínez-Méndez, M.L. Calderón-Espinosa, R.N. Meza-Lázaro, H. Gadsden, L.J. Avila, M. Morando, I.J. de la Riva, P. Victoriano Sepulveda, C.F. Duarte Rocha, N. Ibargüengoytia, C. Aguilar Puntriano, M. Massot, V. Lepetz, T.A. Oksanen, D.G. Chapple, A.M. Bauer, W.R. Branch, J. Clobert, and J.W. Sites, Jr. 2010. Erosion of lizard diversity by climate change and altered thermal niches. *Science* 328: 894–899.
- Sites, J.W., Jr. and R.W. Murphy. 1991. Isozyme evidence for independently derived, duplicate G3PDH loci among squamate reptiles. *Can. J. Zool.* 69:2381–2396.
- Staats, C.M. and J.J. Schall. 1996. Distribution and abundance of two malarial parasites of the endemic *Anolis* lizard of Saba Island, Netherlands Antilles. *J. Parasitol.* 82:409–413.
- and —. 1996. Malarial parasites (*Plasmodium*) of *Anolis* lizards: Biogeography in the Lesser Antilles. *Biotropica* 28:388–393.
- Stamps, J.A. and R.M. Andrews. 1992. Estimating asymptotic size using the largest individuals per sample. *Oecologia* 92:503–512.
- Stenson, A.G., A. Malhotra, and R.S. Thorpe. 2000. Highly polymorphic microsatellite loci from the Dominican Anole (*Anolis oculatus*) and their amplification in other *bimaculatus* series anoles. *Mol. Ecol.* 9:1680–1681.
- , R.S. Thorpe, and A. Malhotra. 2004. Evolutionary differentiation of *bimaculatus* group anoles based on analyses of mtDNA and microsatellite data. *Mol. Phylogen. Evol.* 32:1–10.
- Stettler, P.H. 1978. *Handbuch der Terrarienkunde*. Franckh-Verlag, Stuttgart.
- Telford, S.R., Jr. 2009. *Hemoparasites of the Reptilia*, Color Atlas and Text. CRC Press, Boca Raton, Florida.

- Thomas, G.H., S. Meiri, and A.B. Phillimore. 2009. Body size diversification in *Anolis*: Novel environment and island effects. *Evolution* 63: 2017–2030.
- Underwood, G. 1959. The anoles of the eastern Caribbean, Part III. Revisionary notes. *Bull. Museum Comp. Zool.* 121:191–226.
- . 1962. Reptiles of the Eastern Caribbean. *Carib. Affairs* 1:1–192.
- van Rekum, M. 1960. Ziekte en medicijn. *Lacerta* 19(3):19–20.
- Vitt, L.J. and J.P. Caldwell. 2009. *Herpetology. An Introductory Biology of Amphibians and Reptiles*. 3rd ed. Academic Press, Burlington, Massachusetts.
- Wijffels, L.C.M. 1960. *Anolis*, Gedrag en reacties. *Lacerta* 18(11):82–86.
- . 1964a. *Anolis bimaculatus gingivinus*. *Lacerta* 22(9):41–42.
- . 1964b. *Anolis bimaculatus gingivinus*. *Lacerta* 22(9):49–50.
- . 1980. Natuurlijk. *Bull. Nederl. Studiegr. Anol.* 3(2):5–6.
- Williams, E.E. 1962. IV. The anoles of the northern leewards, Anguilla to Montserrat: New data and a new species, p. 453–465. *In* J.D. Lazell, Jr. and E.E. Williams, The anoles of the eastern Caribbean (Sauria, Iguanidae), parts IV–VI. *Bull. Mus. Comp. Zool.* 127:451–478.
- . 1969. The ecology of colonization as seen in the zoogeography of anoline lizards on small islands. *Quart. Rev. Biol.* 44:345–389.
- . 1972. The origin of faunas. Evolution of lizard congeners in a complex island fauna: A trial analysis. *Evol. Biol.* 6:47–89.
- . 1976. West Indian anoles: A taxonomic and evolutionary summary 1. Introduction and a species list. *Breviora* (440):1–21.
- . 1989. A critique of Guyer and Savage (1986): Cladistic relationships among anoles (Sauria: Iguanidae): Are the data available to reclassify the anoles?, p. 433–478. *In* C.A. Woods (ed.), *Biogeography of the West Indies: Past, Present, and Future*. Sandhill Crane Press, Gainesville, Florida.
- . 1999. Over 300 years of collecting in the Caribbean, p. 1–30. *In* B.I. Crother (ed.), *Caribbean Amphibians and Reptiles*. Academic Press, San Diego, California.
- , H. Rand, A.S. Rand, and R.J. O'Hare. 1995. A computer approach to the comparison and identification of species in difficult taxonomic groups. *Breviora* (502):1–47.
- Wright, E. 2011. Sombbrero: Lizards among the ruins. *Rept. & Amphib.* 18:42–51.
- Yokoyama, M. 2010. The Incomplete Guide to the Wildlife of Saint Martin. CreateSpace (www.create-space.com).
- Zug, G.R., L.J. Vitt, and J.P. Caldwell. 1993. *Herpetology. An Introductory Biology of Amphibians and Reptiles*. Academic Press, Burlington, Massachusetts.
- , —, and —. 2001. *Herpetology. An Introductory Biology of Amphibians and Reptiles*. 2nd ed. Academic Press, Burlington, Massachusetts.

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